

What is claimed is:

1. A magnetic memory comprising:

at least one wire; a magnetoresistive effect element having a storage layer whose magnetization direction varies according to a current magnetic field generated by causing a current to flow in the wire; and first yokes which are provided so as to be spaced from at least one pair of opposed side faces of the magnetoresistive effect element to form a magnetic circuit in cooperation with the magnetoresistive effect element when a current is caused to flow in the wire, each of the first yokes having at least two soft magnetic layers which are stacked via a non-magnetic layer.

2. The magnetic memory according to claim 1, wherein the first yokes are provided so as to correspond to four side faces of the magnetoresistive effect element.

3. The magnetic memory according to claim 1, wherein the non-magnetic layer of each of the first yokes has a film thickness thinner than a shortest distance between an end portion of the first yoke and an end portion of the magnetoresistive effect element.

4. The magnetic memory according to claim 1, wherein the soft magnetic layer is one of a Ni-Fe alloy layer, a Co-Fe-Ni alloy layer, amorphous magnetic layer, and a micro-crystal ferromagnetic layer, and the amorphous magnetic layer or the micro-crystal ferromagnetic layer is formed of any one selected from the group of Co-Fe-AA, Co-Fe-AA-AA2, Fe-AA-AA2, Co-AA-AA2, Co-Mn-AA-AA2, Fe-Cu-AA-AA2, and Co-Fe-Ni-AA, where AA or AA2 comprises at least one selected from the group of B, Si, Ge, Zr, Nb, P, Mo, Ta, N, C, Ti, Al, W, V or rare earth elements.

5. The magnetic memory according to claim 1, wherein the non-magnetic layer comprises at least one element selected from the group of Al, Ga, In, Si, Ge, Ti, Zr, Hf, V, Nb, Ta, Cr, Mo, W, Cu, Zn, Ag, Au, Ru, Re, Os, or alloy thereof, oxide or nitride thereof.

6. The magnetic memory according to claim 1, wherein an interaction between the soft magnetic layers of the first yoke is in a range between -20000e and 5000e.

7. The magnetic memory according to claim 1, wherein the magnetoresistive effect element comprises a tunneling magnetoresistive effect element.

8. The magnetic memory according to claim 1, further comprising a selecting transistor for reading out recorded information stored in the storage layer of the magnetoresistive effect element.

9. The magnetic memory according to claim 1, further comprising a second yoke which is formed so as to cover the wire and which has at least two soft magnetic layers stacked via a non-magnetic layer.

10. A magnetic memory comprises:

at least one wire; a magnetoresistive effect element having a storage layer whose magnetization direction varies according to a current magnetic field generated by causing a current to flow in the wire; and a yoke which is provided at least on both side faces of the wire to form a magnetic circuit in cooperation with the magnetoresistive effect element when a current is caused to flow in the wire, the yoke having at least two soft magnetic layers stacked via a non-magnetic layer.

11. The magnetic memory according to claim 10, further

comprising a barrier metal provided between the yoke and the wire.

12. The magnetic memory according to claim 10, wherein the non-magnetic layer of the yoke has a film thickness thinner than a shortest distance between an end portion of the yoke and an end portion of the magnetoresistive effect element.

13. The magnetic memory according to claim 11, wherein the barrier metal layer is formed of at least one element selected from the group of Ta, Ti, Si, Ge, Al, W, Mo and V or alloy thereof, or oxide or nitride thereof.

14. The magnetic memory according to claim 10, wherein the soft magnetic layer is one of a Ni-Fe alloy layer, a Co-Fe-Ni alloy layer, amorphous magnetic layer, and a micro-crystal ferromagnetic layer, and the amorphous magnetic layer or the micro-crystal ferromagnetic layer is formed of any one selected from the group of Co-Fe-AA, Co-Fe-AA-AA2, Fe-AA-AA2, Co-AA-AA2, Co-Mn-AA-AA2, Fe-Cu-AA-AA2, and Co-Fe-Ni-AA, where AA or AA2 comprises at least one selected from the group of B, Si, Ge, Zr, Nb, P, Mo, Ta, N, C, Ti, Al, W, V or rare earth elements.

15. The magnetic memory according to claim 10, wherein the non-magnetic layer comprises at least one element selected from the group of Al, Ga, In, Si, Ge, Ti, Zr, Hf, V, Nb, Ta, Cr, Mo, W, Cu, Zn, Ag, Au, Ru, Re, Os, or alloy thereof, oxide or nitride thereof.

16. The magnetic memory according to claim 10, wherein an interaction between the soft magnetic layers of the yoke is in a range between -20000e and 5000e.

17. The magnetic memory according to claim 10, wherein

the magnetoresistive effect element comprises a tunneling magnetoresistive effect element.

18. The magnetic memory according to claim 10, further comprising a selecting transistor for reading out recorded information stored in the storage layer of the magnetoresistive effect element.

19. A magnetic memory comprising:

at least one wire; a magnetoresistive effect element having a storage layer whose magnetization direction varies according to a current magnetic field generated by causing a current to flow in the wire; and a yoke which is provided on both side faces of the wire and on an opposite face of the wire to the magnetoresistive effect element to form a magnetic circuit in cooperation with the magnetoresistive effect element when a current is caused to flow in the wire, the yoke having at least two soft magnetic layers stacked via a non-magnetic layer.

20. The magnetic memory according to claim 19, further comprising a barrier metal provided between the yoke and the wire.

21. The magnetic memory according to claim 19, wherein the non-magnetic layer of the yoke has a film thickness thinner than a shortest distance between an end portion of the yoke and an end portion of the magnetoresistive effect element.

22. The magnetic memory according to claim 20, wherein the barrier metal layer is formed of at least one element selected from the group of Ta, Ti, Si, Ge, Al, W, Mo and V or alloy thereof, or oxide or nitride thereof.

23. The magnetic memory according to claim 19, wherein the soft magnetic layer is one of a Ni-Fe alloy layer, a Co-Fe-Ni alloy layer, amorphous magnetic layer, and a micro-crystal ferromagnetic layer, and the amorphous magnetic layer or the micro-crystal ferromagnetic layer is formed of any one selected from the group of Co-Fe-AA, Co-Fe-AA-AA2, Fe-AA-AA2, Co-AA-AA2, Co-Mn-AA-AA2 and Fe-Cu-AA-AA2, and Co-Fe-Ni-AA, where AA or AA2 comprises at least one selected from the group of B, Si, Ge, Zr, Nb, P, Mo, Ta, N, C, Ti, Al, W, V or rare earth elements.
24. The magnetic memory according to claim 19, wherein the non-magnetic layer comprises at least one element selected from the group of Al, Ga, In, Si, Ge, Ti, Zr, Hf, V, Nb, Ta, Cr, Mo, W, Cu, Zn, Ag, Au, Ru, Re, Os, or alloy thereof, oxide or nitride thereof.
25. The magnetic memory according to claim 19, wherein an interaction between the soft magnetic layers of the yoke is in a range between -20000e and 5000e.
26. The magnetic memory according to claim 19, wherein the magnetoresistive effect element comprises a tunneling magnetoresistive effect element.
27. The magnetic memory according to claim 19, further comprising a selecting transistor for reading out recorded information stored in the storage layer of the magnetoresistive effect element.